

CLAIMS:

23. A compact lightweight display device comprising

- (A) a digital micro-mirror device that comprises a multiplicity of individually electronically controlled mirrors, where each mirror has a first position and a second position;
- (B) at least one light source for projecting light onto said digital micro-mirror display device;
- (C) means for transmitting light from the first said light source that is reflected by the micro-mirrors in said first position into an eye of a person viewing said display device; and
- (D) an optional means for transmitting light from the second said light source that is reflected by the micro-mirrors in said second position into the other eye of a person viewing said display device.

24. A display device according to Claim 23 wherein there is a first light source and a second light source and light from said first light source that is reflected by the micro-mirrors that are in said first position is transmitted into one eye of a person viewing said display device and light from said second light source that is reflected by the micro-mirrors that are in said second position is transmitted into the other eye of a person viewing said display device.

25. A display device according to Claim 23 wherein said light source projects white light.
26. A display device according to Claim 23 wherein said light source projects three optical primary colors in succession.
27. A display device according to Claim 23 wherein a pair of concave mirrors focuses and directs said light into the eyes of a viewer to produce two separate images.
28. A display device according to Claim 23 wherein a series of plain and concave mirrors focuses and directs said light into the eyes of a viewer to produce two separate images.
29. A display device according to Claim 23 wherein a series of plain mirrors and lenses focuses and directs said light into the eyes of a viewer to produce two separate images.
30. A display device according to Claim 23 wherein a series of lenses focuses and directs said light into the eyes of a viewer to produce two separate images.
31. A display device according to Claim 23 wherein two off-axis focusing lenses focus and direct the light into a pair of eyepieces and subsequently into the eyes of a

viewer to produce two separate images.

32. A display device according to Claim 23 wherein at least one lens directly in front of and on the same optical axis as said digital micro-mirror device focuses light from said light sources to a pair of focus points where it is reflected from at least one mirror onto at least one concave mirror and then into the eyes of a viewer.

33. A display device according to Claim 23 wherein at least one lens directly in front of and on the same optical axis as said digital micro-mirror device focuses light from said light sources to a pair of off-axis focusing lenses, which in turn focus and direct said light to a pair of eyepieces and subsequently into the eyes of a viewer to produce two separate images.

34. A display device according to Claim 23 wherein at least one lens directly in front of and on the same optical axis as said digital micro-mirror device focuses light from said light sources to a pair of focus points where said light is reflected from at least one mirror onto a pair of off-axis focusing lenses which in turn focus and direct said light to a pair of eyepieces and subsequently into the eyes of a viewer to produce two separate images.

35. A display device according to Claim 33 that incorporates a mechanism to adjust

the spacing between said off-axis focusing lenses to achieve inter-ocular adjustment.

36. A display device according to Claim 34 that incorporates a mechanism to adjust the spacing between said off-axis focusing lenses to achieve inter-ocular adjustment.

37. A display device according to Claim 23 wherein at least one lens directly in front of and on the same optical axis as said digital micro-mirror device focuses the light from said light source to a binocular arrangement of lenses or prisms which in turn focus and direct said light to a pair of eyepieces and subsequently into the eyes of a viewer to produce two separate images.

38. A display device according to Claim 23 wherein at least one of said digital micro-mirror device and said light source is rotated 90 degrees to the optical axis of the viewer and is optically coupled to the remainder of the optical apparatus by a partially silvered or plain mirror.

39. A display device according to Claim 23 wherein said light source comprises a spinning drum of colored filter material oriented along its axis of rotation, where said drum consists of (1) at least three different sections, where each section filters light into one of three optical primary colors; (2) a white light source contained within said drum to provide said light; (3) a collimating lens assembly; (4) an optional diffuser; and (5)

means for rotating said drum.

40. A display device according to Claim 23 wherein said light source comprises (1) a collimating lens; and (2) two spinning drums that share a common axis of rotation but are rotated substantially 180 degrees out of phase with each other, that consist of at least 180 degrees of substantially opaque material in addition to the transparent filter material, wherein only one of said two drums passes light through said collimating lens at any time.

41. A display device according to Claim 23 wherein said light source is at least one laser or light emitting diode.

42. A display device according to Claim 23 wherein said light source comprises (1) three light sources each producing one of the optical primary colors; (2) a series of partially silvered mirrors and optional plain mirror or a series of dichroic mirrors and optional plain mirror; and (3) a diffuser; and (4) an optional collimating lens.

43. A display device according to Claim 23 wherein said light source comprises (1) white light that passes through three color filters capable of filtering it into the three optical primary colors; (2) three separate fast response electronic shutters placed in the optical path of each of said filters; and (3) a series of partially silvered mirrors and

optional plain mirror or a series of dichroic mirrors and optional plain mirror; and (4) a diffuser; and (5) an optional collimating lens.

44. A display device having a plurality of display modules such that the fovea of a viewer's eye substantially covers the central display module in the group with the outer display modules providing image generation for the viewer's peripheral vision.

45. A display device wherein an optical distortion is intentionally inserted into the optical path to generate pin cushion distortion in the resultant image such that the pixel density is higher in the center of the image than the outside.

46. A compact, lightweight display device comprising

(A) a single digital micro-mirror device that comprises a multiplicity of individually electronically controlled mirrors, where each mirror has a first position and a second position;

(B) a first light source positioned on one side of said digital micro-mirror device projecting primary light colors onto said digital micro-mirror display device;

(C) a second light source positioned on the opposite side of said digital micro-mirror device projecting primary light colors onto said digital micro-mirror display device; means for transmitting light from said first light source that is reflected by the micro-mirrors that are in said first position onto a concave mirror which in turn converges said

light to a focus point at the viewer's eye thereby eliminating the need for eyepiece optics; and

(D) means for transmitting light from said second light source that is reflected by the micro-mirrors that are in said second position into onto a concave mirror which in turn converges said light to a focus point at the viewer's other eye thereby eliminating the need for eyepiece optics.

47. A compact, lightweight display device comprising

(A) a single digital micro-mirror device that comprises a multiplicity of individually electronically controlled mirrors, where each mirror has a first position and a second position;

(B) a first light source positioned on one side of said digital micro-mirror device projecting primary light colors onto said digital micro-mirror display device;

(C) a second light source positioned on the opposite side of said digital micro-mirror device projecting primary light colors onto said digital micro-mirror display device;

(D) means for focusing light from said first light source that is reflected by the micro-mirrors that are in said first position to form a real image which is then magnified by eyepiece optics before being transmitted into one eye of a person viewing said display device; and

(E) means for focusing light from said second light source that is reflected by the micro-mirrors that are in said second position to form a real image which is then

magnified by eyepiece optics before being transmitted into the other eye of a person viewing said display device.